Design I – Simply supported slab design to BS8110

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Introduction

- Reinforced concrete slabs are used to form a variety of elements in building structures, namely;
  - Roofs and floors,
  - Staircases,
  - Foundations and
  - Some types of walls.

Types of slabs

- Slabs may be:
  - Solid,
  - Ribbed or waffle,
  - Flat or
  - Composite
- **Note:**
  - In practice, the choice of slab for a particular structure will depend on the loading conditions and the length of the span.

Slab design much simpler than beam design

- Concrete slabs behave primarily as flexural members and design is similar to that of beams, although in general much simpler because:
  - Breadth of slab is already fixed (b = 1000mm)
  - Shear stress are usually low in a slab except when there are heavy concentrated loads, and
  - Compression reinforcement is seldom required.

Simplified Slab Analysis

- BS 8110 allows for a simplified load arrangement for all slabs. Maximum ultimate design load is applied throughout all spans or panels.
- The simplified analysis is subject to 3 conditions:
  - 1). Area of each bay should not be less than 30m2.
  - 2). Live load, qk should be less than 1.25times dead loads, gk
  - 3). Live loads qk should be less than 5kPa excluding partitions.

Design methodology

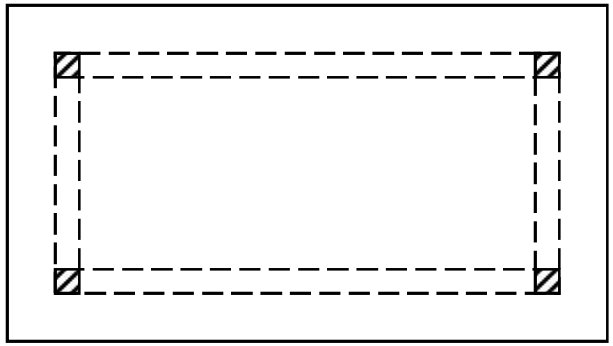
- Step 1: Determination of slab thickness
  - Similar to beam design
  - b=1000mm
  - MF=1.3
  - **Then the effective depth is calculated from:**
  - **‘d = span / (Basic l/d ratio x Modification factor)**

Design methodology

- Step 2: Determination of ultimate design load intensities
- Step 3: Sketch of the current case
- Step 4: Determine the Mid-span and other moments.
- Step 5: Calculate the Tensile reinforcement
- Step 6: Check for deflection
- Step 7: Detail the slab

Class example

- The roof layout of a store is as shown below:
- Ly = 8.0m
- Lx = 1.8m



- Given that fcu = 35N/mm2, fy = 460N/mm2, cover to main steel is 20mm, estimated diameter of main steel is 8mm and imposed load is 1.5kPa, design and detail the slab.